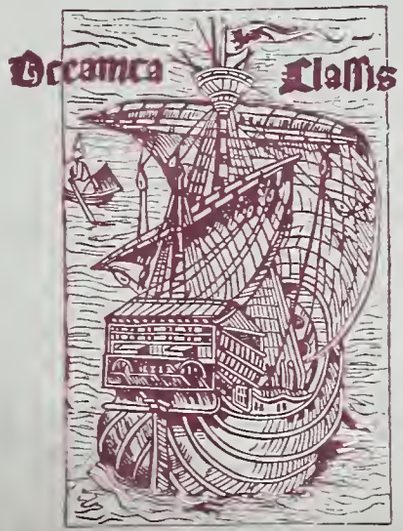
FIFTY CENTS.

# THE CARAVELS OF COLUMBUS;

COMPILED FROM ORIGINAL DOCUMENTS BY

NESTOR PONCE DE LEON.

TRANSLATION REVISED BY MR. FRANK. L. PAVEY.




N. PONCE DE LEON, PUBLISHER,

40 BROADWAY, NEW YORK.

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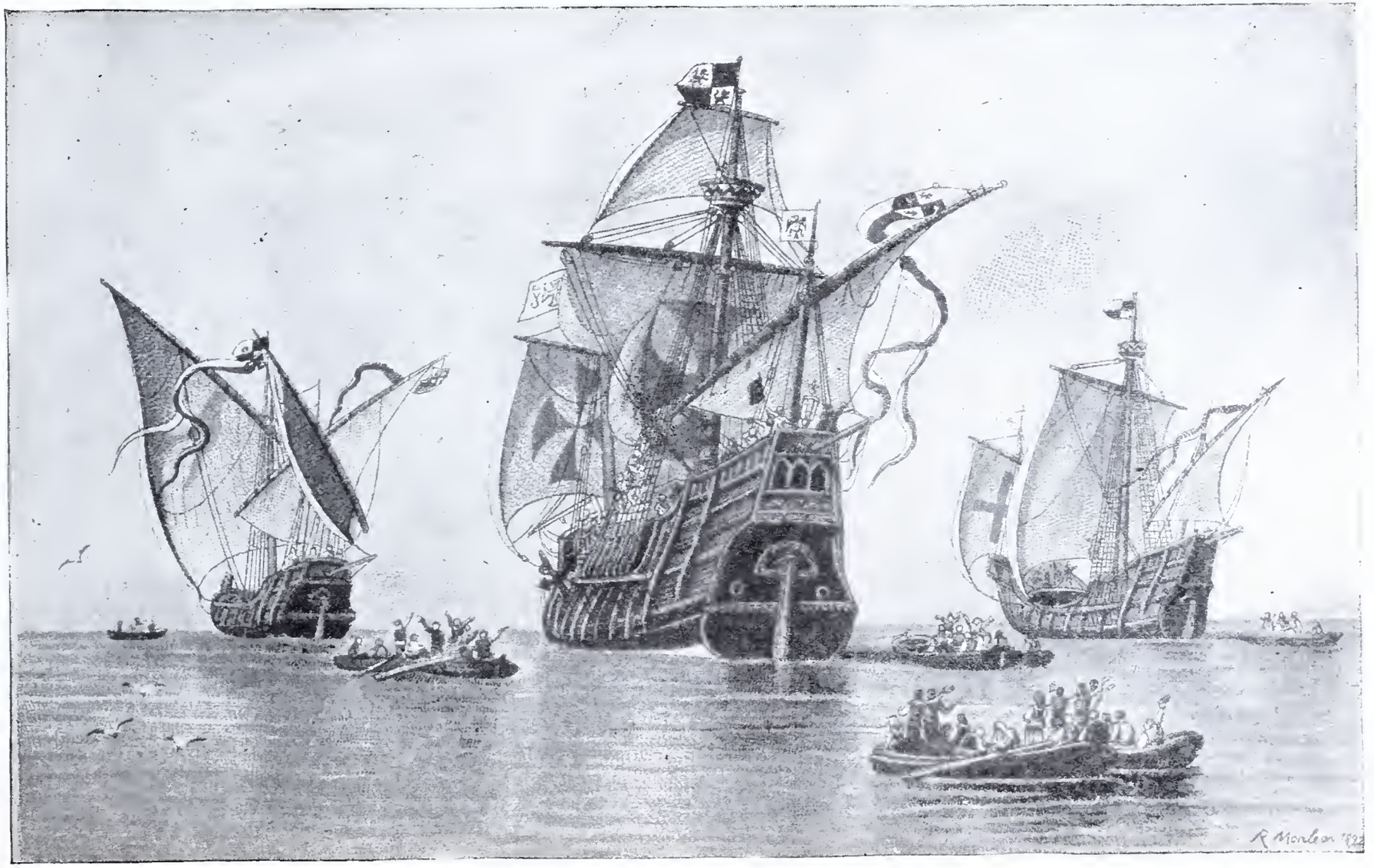
CAULON PRESS,
20 VESEY STREET,
New York.



THE CARAVELS OF COLUMBUS.

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# THE CARAVELS OF COLUMBUS.

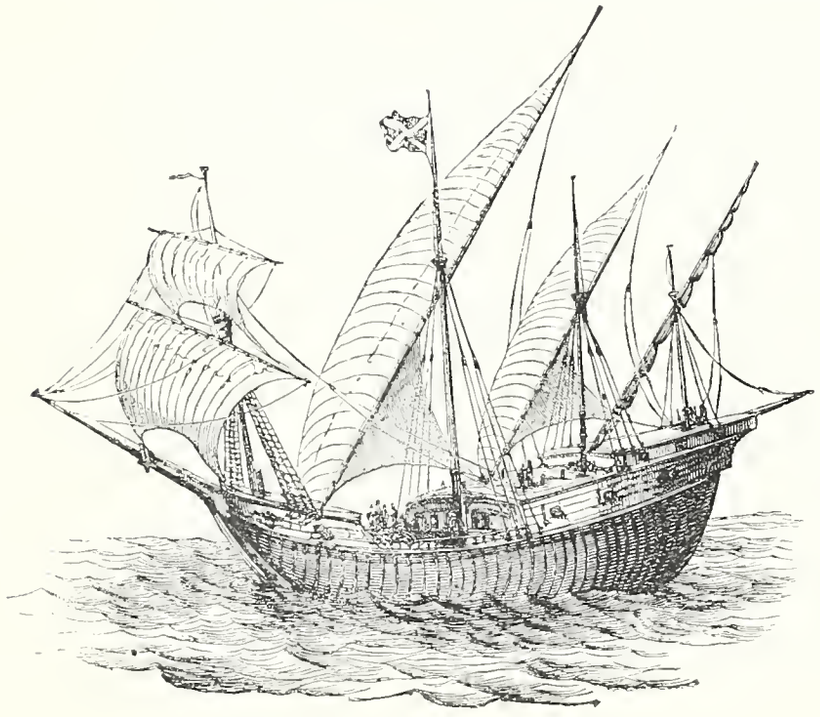
Many authors do not hesitate to misrepresent historical facts, for the purpose of either exalting or decrying the merit or the fame of the persons whose biographers they are, and Columbus was a man of so interesting a personality, and the results of his discoveries were so vast and so important that it is difficult to write about him with strict impartiality. For his apologists, everything connected with him is great, extraordinary and marvelous, while, on the other hand, his detractors maintain that all his glory was due to chance and blind fortune. While the latter endeavor to show that the means at his disposal were more than sufficient for the results achieved, the former maintain that he, and he only—thanks to his great genius—could have accomplished so wonderful an enterprise with means so inadequate.

The truth in this case is, that the means at his disposal were amply sufficient in the hands of an able, determined, persevering man, such as Columbus was, to successfully carry out the enterprise which he had in view, and which he had studied thoroughly. All the papers left by him prove unquestionably that he was not pursuing a visionary project, but a certain end clearly pointed out by the scientific teachings of his time, which then represented the world as much smaller than it really is.

The Spanish chroniclers and the various biographers of Columbus, as well as writers on the history of navigation in general, give the most conflicting descriptions of the caravels, which, on the early morning of the 12th of October, 1492, found themselves face to face with a world, the existence of which had never been suspected by any member of the expedition.

The descriptions given by these writers are not based upon any careful study of the naval architecture of the day. Muñoz and Navarrete, notwithstanding their conscientiousness and erudition, have not given this matter the attention it deserves, and Jahl, Du Sein and Steinmetz, in their well-known works on the *History of Navigation*, endeavored to solve this problem more as antiquarians than as practical naval men.

Many years ago, while Mr. Emilio Ruiz del Arbol, a distinguished Spanish naval officer, was a resident in this city, I tried, with his assistance, to ascertain the truth regarding the caravels, availing myself for this purpose of the numerous references made to them by Columbus himself. Unfortunately for me that gentleman was shortly afterwards promoted to a higher position elsewhere, and being thus unable to profit by his invaluable aid, I was obliged to undertake the task alone. With the help of many good books on ships and naval architecture, I carefully studied all the data from the log-book of the Admiral. I had scarcely commenced my task when I became firmly convinced of three facts: First, that the caravels could not have been so small as represented; second, that they were not undecked ships, unfit for the navigation of the high seas; and, third, that they had not four masts, as is claimed by many writers, among others the authors of the *History of the Spanish Navy*, M. Jahl, and even so accurate an authority as Cronau in his *History of the Discovery*.



CARAVEL OF JURIEU DE LA GRAVIERE.

In my correspondence with Mr. Jorrin, of Havana, many years ago, I gave him my opinion on this point, which is opposed to that of the majority of writers, and, much to my satisfaction, he agreed with me. I also studied very carefully the types of the vessels represented in the charts of that remote period, of some of the most important of which I have excellent facsimiles, and found no vessel among those bearing the legend *Voy á las Indias* or *Vengo de las Indias* (*I go to the Indies* or *I come from the Indies*) with four masts; and even in the famous chart of Juan de la Cosa, the pilot who sailed with Columbus on many of his voyages, including the first, I only find ships with two or three masts, as shown in the illustrations which I have taken from it.

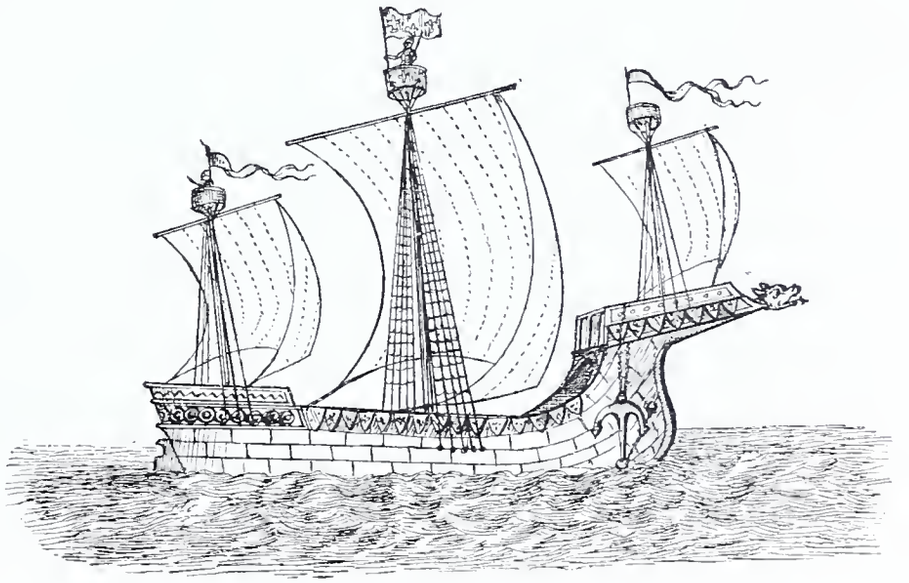
I have been therefore greatly pleased to find that by strictly following the same method as myself two such authorities as Fernandez Duro, a distinguished officer of the Spanish Navy, and Rafael Monleón, an historical painter attached to the

same service, have reached the same conclusions, and their excellent and exhaustive articles and reports have confirmed me in the correctness of my views.

The conclusions of these writers coinciding so closely with my own, and carrying greater weight, I take the liberty of making use in this pamphlet of their very complete reports.

Nothing is more erroneous than the assumption that Columbus accomplished his great discovery in wretched, undecked barks, totally unfit for his purpose. This assumption may, perhaps, lend a more poetical and marvelous aspect to his enterprise, but it is absolutely contradictory to historic truth.

There is no doubt, as Mr. Monleón properly remarks, that the caravels would not have borne comparison with our great transatlantic steamers or our ironclads, but they were excellent vessels for that period, perfectly fitted for their purpose, not inferior to the craft employed by the Portuguese in their great discoveries, and greatly superior to those "dragons" in which the Normans made wonderful voyages through foggy and ice-packed seas, discovering and colonizing Iceland, Greenland and the northern part of America, 500 years before the successful enterprise of Columbus.



NORMAN DRAGON.

The ships were selected by Columbus himself and by the brothers Pinzon, experienced navigators, who would not have undertaken such a hazardous expedition in unknown seas unless they had stanch ships properly fitted up.

Some suppose the caravels to have been only long boats without decks, rigged with three masts and lateen sails. Others describe them as large vessels with four masts and lateen and square sails; others as row barges, somewhat resembling galleys. A study of the log-book of Columbus shows clearly the kind of vessels they were, and the erroneousness of such fanciful descriptions.

Spanish nautical dictionaries give diverse definitions of the word "carabela." The *Diccionario Maritimo*, published at Madrid in 1864, by Messrs. Lorenzo, Murga & Ferreiro, three officers of the Hydrographical Department, describe it as "a

VESSELS OF COLUMBUS.

long and narrow vessel, with a single deck, a beak at the prow, flat stern, three masts without tops, and a lateen sail on each of them."

The *Diccionario Marítimo Español*, published by royal command at Madrid, in 1831, describes it almost in the same terms, viz., "a long and narrow vessel, with three masts without tops, a beak at the prow, flat stern and lateen sails."

Clairac, after copying the definition in the dictionary of Lorenzo, gives an engraving taken from Jurieu de la Gravière, in which the caravel is represented with four masts, and adds: "The caravels of Columbus had two high castles, one fore and the other aft; three vertical masts and bowsprit; the mainmast and the foremast square-rigged, and a lateen-rigged mizzen mast." This description, which he takes from the reports of M. Fernandez Duro, is entirely correct, as has been clearly demonstrated by Fernandez Duro himself and Monleón.

The name *carabela*, Mr. Monleón rightly says, was not then applied to a particular form of vessel, but only to certain vessels of medium tonnage and fast sailing powers, suitable for use in the fisheries and coasting trade, as well as in exploring expeditions, but without meaning any particular type of construction, or any special rig, just as our modern *dispatch boats*, which, though differing much in type, tonnage and rigging, are yet all known by the same name.

Columbus himself very frequently called all his vessels by the different terms *naos*, *navíos* or *carabelas*. If he generally called the Santa Maria the *nao* it was only because she was the admiral's ship, and not on account of her particular type, and he, as well as all his contemporary navigators, applied these names indiscriminately to their vessels.

In regard to the size of the vessels, I believe that they were a great deal larger than is generally supposed. The Santa Maria, according to Monleón, ought to have had a displacement of 180 to 200 metric tons, as she could carry 120 double pipes of Cantabria. Furthermore, we must remember that she had a crew of seventy men, with artillery and stores for one year, and a large amount of trinkets and other goods and merchandise for bartering with the Cipango and Cathay people, whom Columbus expected to meet. Therefore, I believe Mr. Monleón is right in saying that the Santa Maria would bear comparison with a brig of the present day, with swelling sides and a very full poop.

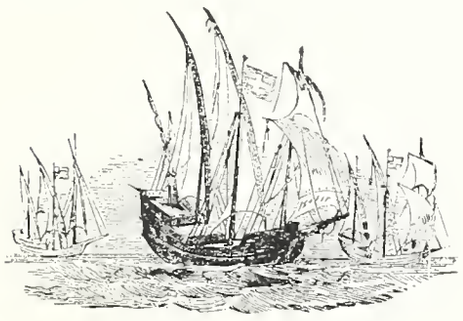
The Pinta and the Niña were smaller, but there are no means of estimating their tonnage, as we have no data for it. They were not, however, as small as supposed, for Columbus, on his second voyage, demanded and sought for smaller vessels, as the others had given him much trouble on account of their large size and draught.

It has been asserted that they were undecked vessels, but that seems to me utterly impossible, not only on account of their size, but because Columbus and the Pinzon brothers were too experienced seamen to have undertaken such an expedition in vessels which would have been easily swamped by shipping a heavy sea. They were well aware of the tempestuousness of the Atlantic Ocean, as they had already navigated it, Columbus having been as far north as Iceland and

south to the Fortress of La Mina, and he and his companions state that their vessels were entirely adequate for the enterprise, which an undecked vessel certainly would not have been.

It must also be borne in mind that the Santa Maria was a vessel constructed in the Bay of Biscay, expressly for the purpose of making voyages to Flanders. This bay is greatly dreaded by seamen on account of the boisterous seas, and cannot very well be navigated by undecked vessels. The Pinta and the Niña were built for the Mediterranean trade, but the selection of them by the same men who were to be their commanders—the brothers Pinzon—is sufficient evidence that they were well adapted for the proposed expedition.

The three ships were good sailers. As shown by the log-book of Columbus, their speed was equal to that of sailing ships of the present day. As for their rigging, I will quote from Columbus himself, who wrote in his log-book, on the 24th of October, "E tornó a ventar muy amoroso, e yo llevaba todas mis velas, de la nao, *maestra*, *con dos bonetas*, *y vela de gavia y trinquete y cebadera y mesana* y el batel por popa," which means, "The wind commenced to blow softly once more, and I carried every one of the sails of the ship, the *mainsail* with two bonnets, and the maintopsail, foresail, the spritsail and mizzen sail and the boat by the poop." This makes five sails, without counting the two bonnets added to the mainsail, on the three masts of the vessel and the bowsprit. The pictures in the chart of Juan de la Cosa, pilot of Columbus, show exactly the same number of masts and the same sails. Columbus very often mentions the sails of the ships by their names, and in this passage every one of them is named, even to the two bonnets, which are small auxiliary sails. Therefore, it is certain that the *nao*, which was the largest ship, had no more than the three masts required for these sails.



FLEET OF COLUMBUS.

So many, so varied, and at times so erroneous have been the conceptions of the majority of those writers who have treated of Columbus and his discovery, in reference to the kind of vessels (naos or caravels) employed in the fifteenth century, that very far from clearing up the matter they have really succeeded in further confusing it. Some modern writers have nevertheless tried to point out a rational method for the solution of the problem by following out a process of induction and deduction, based on authentic documents which would lead us to a type of vessel with at least some semblance of truth, inasmuch as those described by the older writers are more or less imaginary.

Don Cesareo F Duro, a naval officer and a member of the "Academia de la Historia," who for many years has

given great attention to this matter, as shown by his different works, figures in the front rank among these authors.

On the occasion of the fourth centennial of the discovery of the New World, there arose, in connection with the idea of celebrating the event in a proper manner, a universal desire for reliable information in regard not only to the origin of the idea and the circumstances of its realization, but also all the details, the persons who took part in the movement, their character, habits, resources and means.

Every one seems to agree that preference should be given in these investigations to a study of the appearance and condition of those vessels which, in view of the magnitude of the enterprise were destined to become more famous than Jason's ship. Many distinguished naval officers and archeologists in Germany, Italy, Portugal and America have tried to solve this problem. In Spain Messrs. Fernandez Duro and Monleón dedicated themselves to the work, the first bringing to light many curious documents long forgotten in the archives, while the second with his pencil cleared up many doubts, and the results of their combined efforts were submitted to the public in the "Revista General de Marina."

CARAVEL FROM A PRINT OF THE XV. CENTURY.

Matters having reached this point the government of Spain thought it was more incumbent on Spain than on any other country to construct a vessel of the fifteenth century, as nearly as possible a fac-simile of the famous Santa Maria, the flagship of the bold navigator and discoverer of the New World, which, while serving as a tangible expression of the naval architecture of those times, should also demonstrate to the present generation the sort of material and resources employed by our ancestors in exploring and making known the shape and dimensions of the earth.

For this purpose the Ministry appointed a committee presided over by a general officer of naval engineers, Mr. Casimiro Bona, and composed of the following members: Cesareo F. Duro, Captain in the Navy; Rafael Monleón, Artist; and Captain Emilio Ruiz del Arbol, Secretary. The "Academia de la Historia" was requested to appoint two of its members to this committee, and designated Messrs. Aureliano Fernandez Guerra and Juan de Dios de la Rada y Delgado. Mr. Monleón presented to this committee his plans and models, together with his monograph, entitled "Restauracion Hipotética de las Caravelas de Cristóbal Colón," which were accepted, with the proviso that all obscure and difficult points, of which the President presented an interesting summary, should be thoroughly discussed.

In the following meetings the principal dimensions of the hull and its accessories, the tonnage and general appearance of the vessel, its internal divisions, and even its furniture and fittings, were determined in accordance with the proportions and customs that have come down in writing to our day.

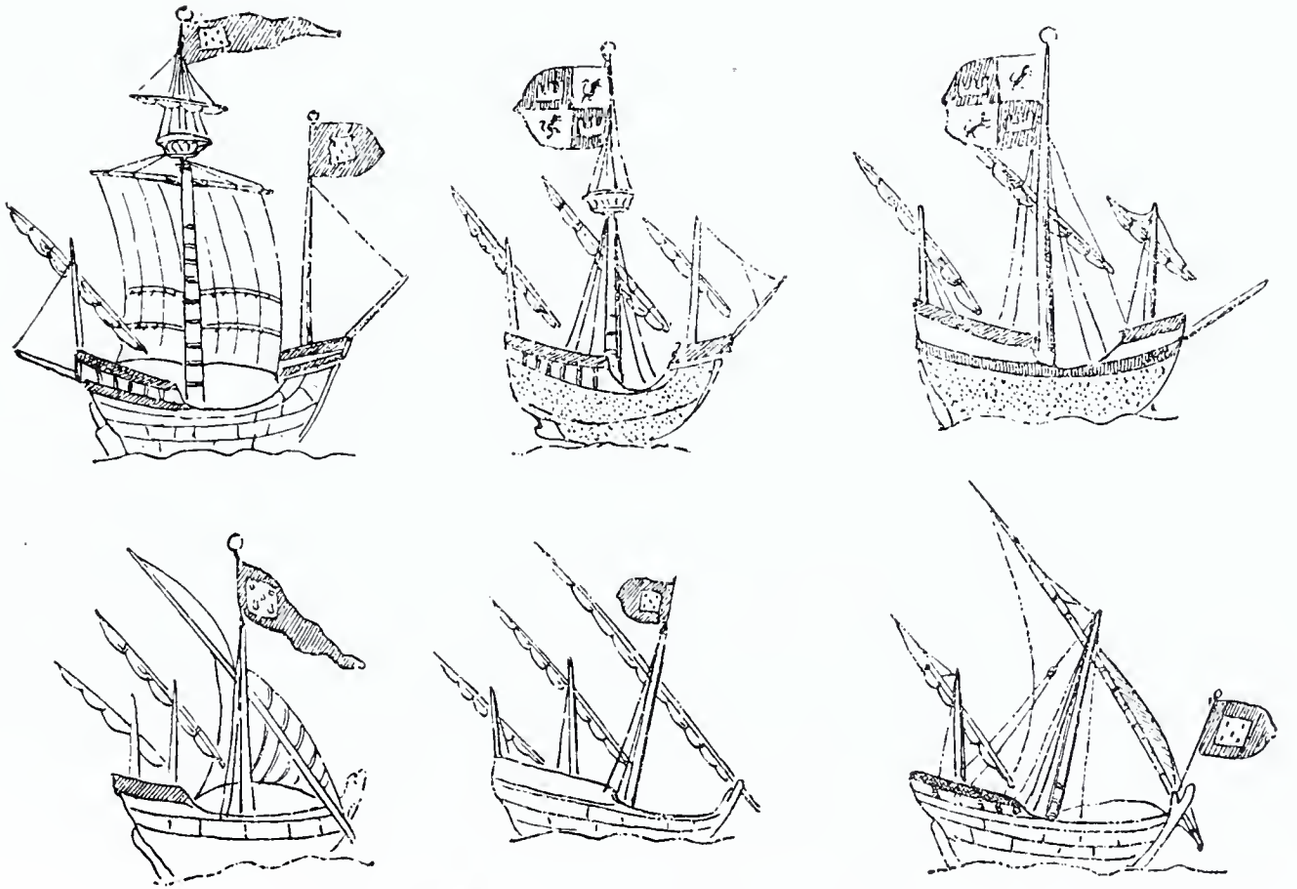
Mr Bona undertook to calculate its stability and determine its structure, the masts and yards, the sail area, etc., a task which he executed in the most careful manner.

The Minister of the Navy accepted the report and plans of the committee, being perfectly satisfied with its findings. He gave orders to make an estimate of the work, with the understanding that the navy yards of the State would furnish the material on hand which had no direct application to modern ship-building, and that the Board of Directors of the Centennial should advance the necessary funds to pay for such other materials as were not available at the navy yards.

The project was presented to the Legislative Body and finally received its sanction. In the meantime, in order to gain time, an Executive Committee was created by Royal Decree and empowered to carry out the project in co-operation with a naval engineer, and given ample authority to settle all doubts, overcome all difficulties, and also to disburse the sums of money advanced by the Board of Directors of the Centennial.

The members of this committee were as follows: Captain Cesareo F. Duro, President; Lieutenant Francisco Cardona; Rafael Monleón, Restorer for the Naval Museum; and Paymaster F. G. Simico, Secretary. Mr. Leopoldo Puente was appointed engineer to superintend the construction.

The keel of the Santa Maria was laid in the stocks at the Arsenal at Carraca on the 23d of April, 1892. Certain foreseen difficulties having been overcome by Mr. Cardona, who represented the committee at Cadiz, with the aid and assistance of the authorities, the work was well and rapidly carried forward. Mr. Puente identified himself with the idea thoroughly. Understanding the nature of the work before him, so different from the modern, with excellent judgment, he knew how to harmonize professional exigencies with the necessity of giving the vessel a true old character, availing himself of all the modern advances in science for realizing the old construction. He displayed such activity, and such was the enthusiasm and good will of the workmen and laborers under him in the different workshops of the Arsenal, that on the 26th day of June—seventy-three days after the work was begun—the hull of the new Santa Maria slid down the ways, dipping her stem in the salt waves, proudly floating, amid the cheers of the multitude, and drawing 1 m. 47 c. m., according to the exact calculations.



CARAVELS FROM THE MAP OF JUAN DE LA COSA.

It was now necessary to rig the ship and arrange the internal and external decorations, to mount the guns and complete other details.

The new construction, so far as it has been possible to accomplish it after the lapse of four centuries, is a facsimile of the vessel commanded by Columbus on his first voyage to the unknown lands of the West, found on the way to Cathay and Cipango, which he sought.

The points of difference peculiar to modern vessels, which it has been necessary to introduce without intentionally affecting its archæological character, are easily explained—first, by the handiwork, by the use of instruments and industrial processes so different at the present time from those in use in the middle ages, and second, by the rapidity of construction. The short time in which the vessel was built did not permit minute inspection nor detailed care, in many matters of which we have no complete data.

The new Santa Maria measures, in length, 22.60 m. ; in beam, 7.80 m. ; in depth amidships, 4 10 m. ; in the deck, 8.20 m. ; in the castle, 4.90 m., and weighs 127.57 tons.

Making as little use as possible of technical terms, it may be said that the hull is short, wide and very high as compared with the ships of to-day, very full below, with short runs, convex knees and flat bottom. The ends have considerable overhang, being sufficiently broad to have large displacement, thus enabling them to bear the great weight of the castles. The sides have quite a bilge ; the gunwale is high, broad and thick ; strakes run from stem to stern, securing the frame with other outside bracers called riders. For the purpose of strengthening it vertically, the bows are full and round ; the stern entirely flat, in the shape of a shield, as it was formerly called, with a large hole, called the helm port, above the first transom, through which the tiller passes. Two smaller openings, corresponding to the hawse holes in the bow, are used for passing the stern fastenings through. The rudder, with a broad blade, as the runs are very short, is strengthened in all its parts and managed by a horizontal tiller from the gun deck under the quarter deck.

The Santa Maria has only one deck. Between this and the hold there is a series of uncovered cross beams, upon which, when necessary for comfort or the storing of the cargo, a flooring is placed, thus forming a false orlop. Forward is the ammunition room and aft the steward's room. On deck two hatchways communicate with the hold and two scuttles with the rooms. Above the deck, from amidships to the stern, runs the quarter deck. The two are connected by a hatchway and stairs. From the quarter deck rises the cabin—the commander's quarters. Its deck is called the poop deck. Underneath the quarter deck, the main deck is large and roomy, and there, guarded from the weather, the officers and sailors

have their sleeping quarters, although the latter prefer the advantages offered by the forecastle, which is overhanging, and to a great extent appears to be suspended over the sea.

The rigging consists of three masts—the main, the fore and the mizzen masts—with square sails on the first two. The main mast carries the main sail, with two bonnets and a topsail. The foremast has a foresail only. On the mizzen mast there is a lateen sail. In addition to this, the bowsprit has a sprit sail on an inclined yard. All these sails, as well as the mast yards, are fitted so as to be handled in the old style.

The main mast is held by eight shrouds on each side, two pendants and backstays and two stays—the main and flagstaff stay. The foremast has only two tackles and the stay on each side. The mizzen mast is rigged in the same way as the foremast, and they, therefore, have no chain wales, dead eyes or laniards, as the main mast has, and are used almost entirely for steering the ship.

In the yards they have imitated the rigging—double halliards, quadruple lifts, with pulleys, pendants, braces, trusses and parrel. The sails have no reefs. The area of the main sail is increased by means of bonnets sewed with woven bolt ropes. The mizzen is handled with vangs at the peak, lifts at the head of the yard and outrigger overhanging the stern. The sprit sail runs along the boom, and is handled like the square sails, with braces and sheets.

It is unnecessary to explain the running of the ropes, as that will be easily understood by sailors. It might be well to state that the Santa Maria is described by Columbus in his diary, as stated above.

The new vessel, like the original, is provided with two boats; the first a large boat, which was rarely hoisted on board because of its size. This boat was about 15 cubits (30 feet) in length, had seven double benches for parallel oarsmen, and was capable of filling the vessel at fifty loads. The second was a shallop—a launch rather than a boat—with a broad and flat stem and five double benches for oarsmen. It was generally hoisted on board on leaving port. The dimensions of the long boat are: length, 30 feet; beam, 9 feet; depth, 4½ feet; the shallop was about one-third less, and had full stern and narrow bow.

The deck was furthermore encumbered by the galley, wherein the cooking was done, by wooden casks for drinking water, by the lombards, the spare yards, and armament.

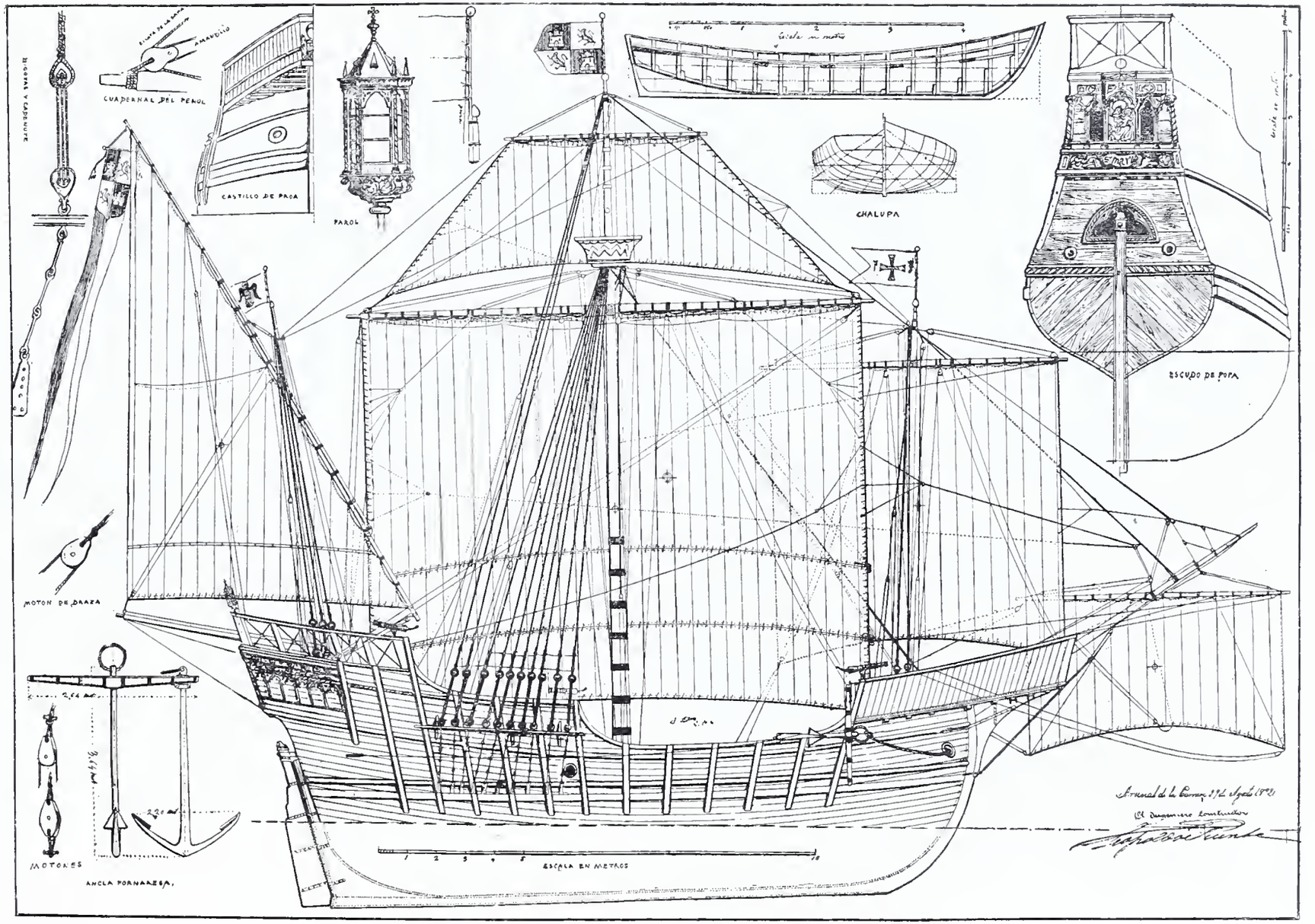
Although the original vessels were usually moored with four small anchors weighing from 8 to 12 cwts., the commission saw no objection in making use of two anchors cast toward the end of the sixteenth century that were recently found buried at the Carraca navy-yard. These are exactly like those employed in the times of Columbus, but are a little

heavier and larger than the ones used upon his vessel. They are left in the same condition in which they were found, with the exception of the wooden stocks, which had to be restored. The sheet anchor is the only one that has been made anew according to drawings and rules of that period.

The armament of the flagship consists of two lombards on the gun deck underneath the quarter deck, and six falconets on the upper gunwales of the castles. These pieces were made in the artillery works of the navy yard at Carraca, under the directions of Lieutenant-Colonel M. R. Izquierdo, employing the same process in use during the fifteenth century. This proved so successful that if they only bore the signs of age they could be mistaken for the original pieces. They are mounted on naval gun carriages, and fire balls of stone weighing two pounds. The models of the gun carriages, lombards and falconets were made by Mr. Monleón from data mentioned before.

In order to give some idea of the small arms, panoplies have been arranged on the gun deck and in the cabin. These comprise armor, helmets, swords, lances, pikes, battle-axes and boarding axes, bucklers and crossbows; cases of slugs, balls, powder-flasks and springolds. We do not know the exact number, but it is well known that the crews of the vessels were well provided with such arms, and the knights and squires could hardly have been lacking in them. The costumes were designed in water colors by Mr. Monleón, who had before him not only pictures of the pilots, sailors and other seamen, but also the men at arms of the district and the coast with their fine accoutrements. These are hung in frames near the panoplies.

In reference to the decoration of the vessels it must be said that some changes have been made in consideration of the occasion in which the new Santa Maria figures. The sailors of that period were not much addicted to ornamentation or painting. They coated the raised portions of the woodwork, such as the wales, mouldings and perpendicular braces with tar varnish or with whale blubber; the less exposed parts they stained with red ochre, lamp black or other ill-defined natural color. The bottoms were usually greased, the operation being frequently repeated. For this purpose the ships were sometimes beached in places fit for the purpose. This was done twice during the first voyage, first in Cuba and then in St. Domingo. Nevertheless it has been deemed appropriate to decorate the stern of the new vessels with ornaments of the period. With this in view a small canopy has been made wherein is placed the image of the Virgin, as was usually done in vessels of a certain degree of importance, or in vessels constructed for a special purpose, since the time of Alphonso the Wise. To dress the ship they chose certain simple waist-bands of red and white material; on these bands are painted the coat of arms of Castile, Leon, Aragon and Sicily, as more appropriate and usual in vessels of war. The



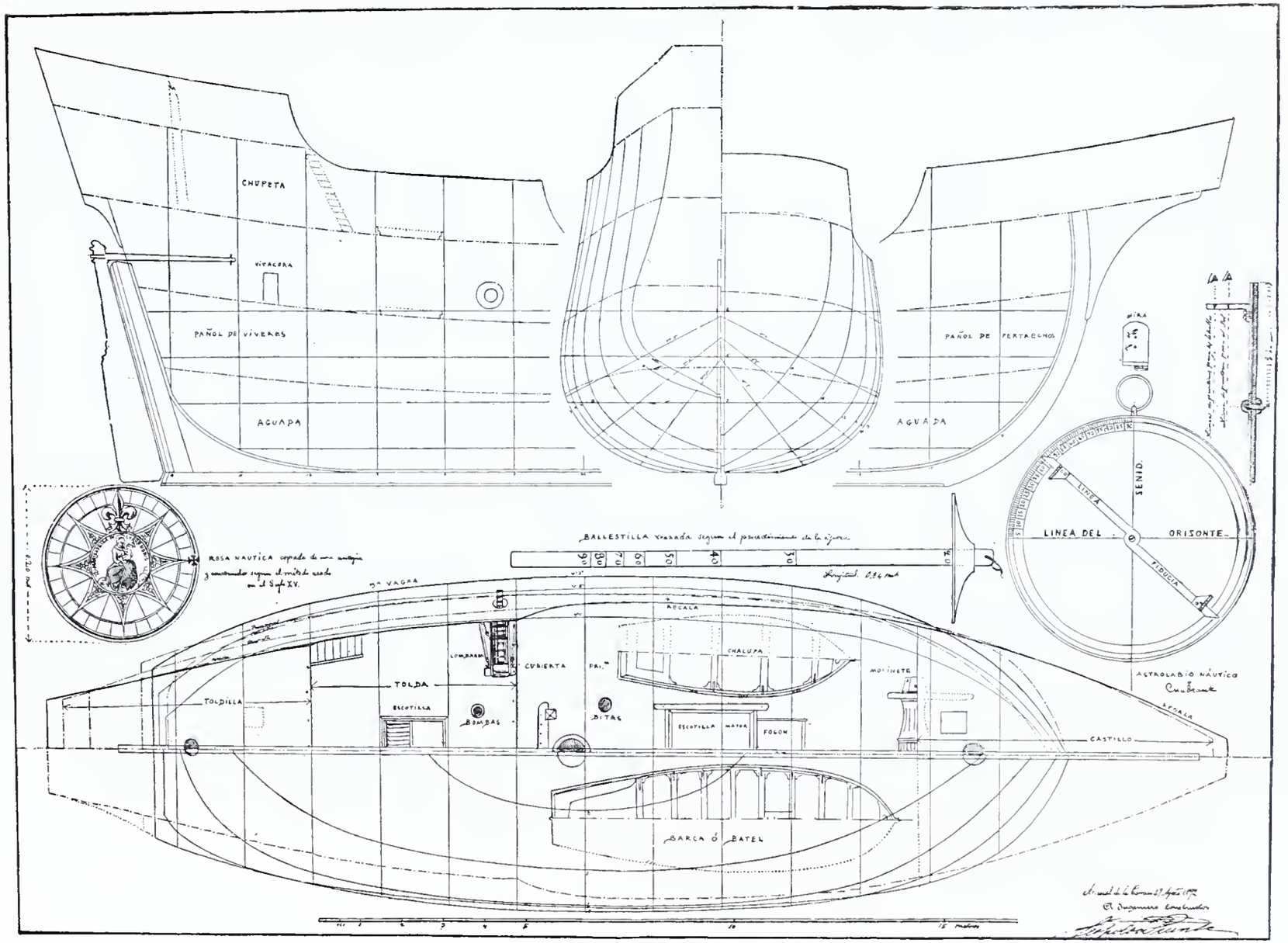

PLANS, SECTIONS AND DETAILS OF THE NEW SANTA MARIA.

blazon will also be found on the pennants besides the Green Cross, the emblem of this enterprise of discovery. On the foremast and above all, at the main top is the standard of Castile quartered in red and white, with the golden castle and lions gules. On the mast is the coat of arms of the Catholic Kings, guarded over by the Eagle of St. John the Evangelist, as it is seen in the Chapel of San Juan de los Reyes at Toledo, and on the golden coins called "Excelentes." On the top mizzen yard arm is the traditional great streamer of the Castilian Armada. Besides the flags the vessels carry another streamer with the arms of Spain and the motto of the Catholic Kings, "Tanto Monta," and a painted crucifix, as was customary in those days.

It has already been stated that there was no closed room on board other than the roundhouse. We must take it for granted that, in view of the high rank held by Columbus, his quarters were there. The quarters have been fitted up strictly with the furniture mentioned in his log. A bed draped in red, press for clothes, charts and books, a stool, two chairs and a dining table for two persons; all of the Gothic style then in vogue. The furnishings and decorations are completed by an image of the Virgin—"Maris Stella," patroness of navigators—before which the "Salve" was sung every Saturday.

The binnacle, the quadrant and the cross-staff, as well as the insignia lantern at the stern, were carefully constructed from models of the times. The same care has been used in reproducing the pennant, the symbol of the royal powers conferred on Columbus as admiral, a precious emblem which he held in his hand on setting foot upon and taking possession of the discovered land. This pennant, when on board, was placed to starboard on official occasions. It was the emblem before which all others were lowered. Borne by an ensign, it followed the admiral when in command, who, in moments of extreme danger or of victory, carried it in his own hand From some of those pennants preserved in the Armeria Real it appears that they were made of crimson damask, embroidered and embossed in gold, showing on one side the image of the Savior on the Cross and that of the Virgin on the other. They are ornamented with gold and silken cords and tassels.

Many other curious details—the shape of the pulleys, the position of the bits, the manner of storing powder, balls, provisions and water—have been studied. They are interesting, and would have been explained, but this cursory description does not permit it. It is enough to know that, if everything is not absolutely accurate, if anything does not exactly correspond in form and place to that which it is intended to represent, it is because every wish cannot be realized, especially when, as in this case, the short time, the want of certain materials and the lack of special training are taken into consideration. It was not an easy matter to convince the laborers that they were to deliver their work in so rude and unfinished a state.




PLANS, SECTIONS AND DETAILS OF THE NEW SANTA MARIA.

The new ship, therefore, is heavier in wood, more solid, and undoubtedly better finished than the old. For, notwithstanding the fact that the original was one of the best of its class, its sides certainly were not boarded over, but the timbers' ends were uncovered, like the interior framework of the new one. The gunwales, or bulwarks, were certainly lower, particularly those of the castle. The gunwale was of simple design, without railings. The wales were stronger and wider, and studded with big-headed nails. The cordage, though of good Calatayud hemp, was not so well made nor the masts so straight. In short, even if well made and appropriate to the state of knowledge of that period, everything in the fifteenth century was rudely done and less finished than at present, as the result of conditions impossible to reproduce to-day.

To justify the resolutions and decisions of the consulting board which first tried to interpret the idea of the government, and the acts of the executive committee which afterward endeavored to realize it, the following concise summary of those documents that have served as guides in the studies enabling them to reach their conclusions is proper at this point.

The first series consists of Spanish navigation charts, dated before and after the time of Columbus, of which there are quite a number, and upon which are found drawn by expert hands the vessels, flags, arms, compasses and other instruments of navigation. Among them we find some furnishing rare data, for example that of Juan de la Cosa, master and pilot under Columbus on the first two voyages, and, as happened, owner of the original Santa Maria.

He drew this chart or map of the world in the port of Santa Maria in the year 1500. It is now kept in the Naval Museum at Madrid as a geographical monument. On tracing for the first time the coasts of Terra Firma he painted near them two ships at anchor with the standard of Castile at the main mast, placing it as well on the several islands and the different ports of the coast of which they had taken possession. On the coast of Africa he drew other vessels and caravels with the flag of Portugal The form and fittings of the square and lateen sails may be distinguished at a glance.

Another chart, the first that was ever made of the island of Hispaniola, is in possession of the "Biblioteca Colombina" of Seville. They flatter themselves there with the belief that it was the work of the Admiral, but it is more probable that it was traced by his son Fernando Colon, to whom it belonged. At any rate it shows in two different places, three ships, two square rigged the other lateen, sailing in company.

Even if they were not intended to represent the famous vessels that made the discovery, which is at least probable,

we are certainly safe in believing that they represent the type of the period, and it is remarkable how closely they agree in all essential details with those of Juan de la Cosa.

The letter in which Columbus informed Gabriel Sanchez of the finding of the islands in the Ocean was printed in Rome in 1493, with cuts of the vessels treated conventionally, it is true, but by no means to be despised for many reasons.

There are many illustrations in the books of the period similar to these. Two printed in the sixteenth century and treating of the art of navigation are still more highly esteemed and entitled to preference as authorities; the Regimientos of the Maestro Pedro de Medina, printed at Seville, and the Consulado de Mar, issued at Barcelona in 1502. Mr. Duro has collected a number of these drawings and engravings. They form a very rare and useful nautical collection.

By comparing the sketches with the evidences of the details, though somewhat out of proportion at times, an evidence in itself of their authenticity due to the fact that some objects rather than others aroused the interest and curiosity of the copyists, the complete picture is at least made out; taking from one the castles fore and aft perfectly delineated, from another the vertical braces, the wales and the mouldings, from others the chain-walls and dead eyes, the helm port and its accessories, and again the rigging with all minor details of masts and yards, the handling of the sails and their bonnets, and finally the costumes, the waistbands, the standards and streamers with their showy cords and tassels.

Certain details can be studied to better advantage from paintings and sculptures. Among those examined by the commission was the picture found in the Sacristy of the Church of Zumaya, dated 1495, and representing a battle between Portuguese and Spanish vessels, and the beautiful relief work of the Parish of San Nicholas at Burgos, representing with incomparable delicacy vessels in a storm.

The same detailed examination has been made of the treatises and rules relating to shipbuilding in all its branches. The subjects of ammunition and armament have been studied in the descriptions of Royal voyages and military journeys collected by the same academician, together with details of vessels, artillery, crews, salaries, rations, regulations, duties, and services. Yet we are confronted with one obstacle which all diligence and efforts cannot overcome. In the ruins of buildings of ages, no matter how remote, something always remains to aid us in forming an idea of the monument as it originally stood, or at least some idea of the handiwork that fashioned it. But vessels are constructed of materials perishable or easily destructible, and everything has disappeared together with the embodied idea. That branch of archeology, therefore, relating to shipbuilding is the most difficult.

Messrs. Fernandez Duro and Rafael Monleón, after thorough study of the matter, have come to the following conclusions regarding the dimensions and other details of the Santa Maria :

| | |
|---|---|
| Length of keel, | 69 feet. |
| Length of water line at 9 feet, | 77¾ " |
| Length over all, | 84 " |
| Beam without lining, | 26 " |
| Depth of hold, | 12 " |
| Overhang in the bow, | 11 " |
| " " stern, | 5 " |
| Width of beam at the stern transom, | 16 " |
| Mean draft, | 9 " |
| Maximum draft, | 10 " |
| Minimum " | 6 " |

The displacement was from 200 to 240 metric tons. The ends were very full, with flat stern, as can be seen in the drawing. They had no port lids nor light ports, except in the round house at the stern. The combings of the hatchways were nearly flush with the deck, and in stormy weather were closed by heavy hatches. For small vessels the frame ribs were single and the spaces between them were equal to their width. The filling was sometimes a kind of cement, serving as dead ballast. The seams were of simple character and covered with boards.

The nails employed in the Santa Maria were of iron—not so durable as bronze, but less expensive. The upper gunwales had thick covers, and on the castles fore and aft were placed wooden defences for the archers. Sometimes they hung up the blazoned shields of the combatants for the same purpose, and from this custom the idea of armor plates originated.

The anchors had long shafts, thin arms, triangular bills, large wooden stocks with beveled borders and iron bands or rope lashings. Escalante estimates that vessels of 100 tons carried anchors of ten hundredweight and the same weight of cable. It is also stated that the vessels carried from two to four ordinary anchors, according to size, and another, called a sheet anchor, forward, as well as a small stream anchor.

The long boat and shallop carried grappling irons. The sheet anchor weighed from sixteen to eighteen hundredweight, the grappling iron of the long boat 150 pounds and the shallop's 100 pounds. The two ordinary anchors were carried at the bows, the sheet anchor on board, near the hatchway, at hand in case of need.

No apparatus was employed for handling the anchors, and they were shipped by means of the fore yard arm.

Two kinds of ballast, fixed and portable, were made use of. The first consisted of stones cemented with mortar, and the other of large rocks, stones, gravel, etc. Iron was also used as ballast, but not so frequently as stone.

The rudder was straight, wide at the bottom and narrow toward the top. Generally it had no chains, which were only used in rough weather. It was managed by a tiller bar at the head. The pumps were of wood.

The exact numbers of the crews cannot be ascertained because of discrepancies in the writings of the period. It seems that the three vessels carried 120 men all told, about sixty on the Santa Maria alone. They carried provisions for about a year. Columbus noted in his diary that he left Palos with plenty of stores and provisions. This is substantiated by the fact that the supply of biscuit lasted till the end of the return voyage. It may be assumed that they took provisions for six months, and all the water they could carry.

## RIGGING.

It is well known, because mentioned by Columbus himself in his log-book, that the vessels of the expedition were three-masted. The main mast, slightly raked aft, was at least as long as the keel, plus the overhang of the bows. It was a single stick, very thick, and strengthened by wooldings at intervals of two feet. As it was the only mast of propulsion (the others serving merely for steering purposes), it was firmly fixed and strengthened. That of the Santa Maria measured from two to two and a half feet in diameter below and from one to one and a half feet at the top.

The foremast, slightly raked forward, measured nearly one half the length of the main mast, and one-third less in thickness. It had no pole head, and sometimes it did not reach down to the keel, and had its step in the main deck.

The mizzen mast, raked aft, and was a little shorter than the foremast. It carried a pole head, and had its step in the quarter deck.

Besides these three vertical masts the vessel carried a bowsprit, bent and thin at the extremity, and one-fifth less than the mizzen mast.

The model at the naval museum and the bass-relief at Burgos show that the top rigging was very simple, the shrouds being handled by pulleys and laniards.

The main mast had a circular top, supported by timbers forming a double cross. This top consisted of a wooden frame lined with leather and painted. In battle it was used as a point from which to throw darts, stones and javelins. From it was furled the topsail, which was trapezoidal in shape.

The sail area of the Santa Maria is calculated as follows:

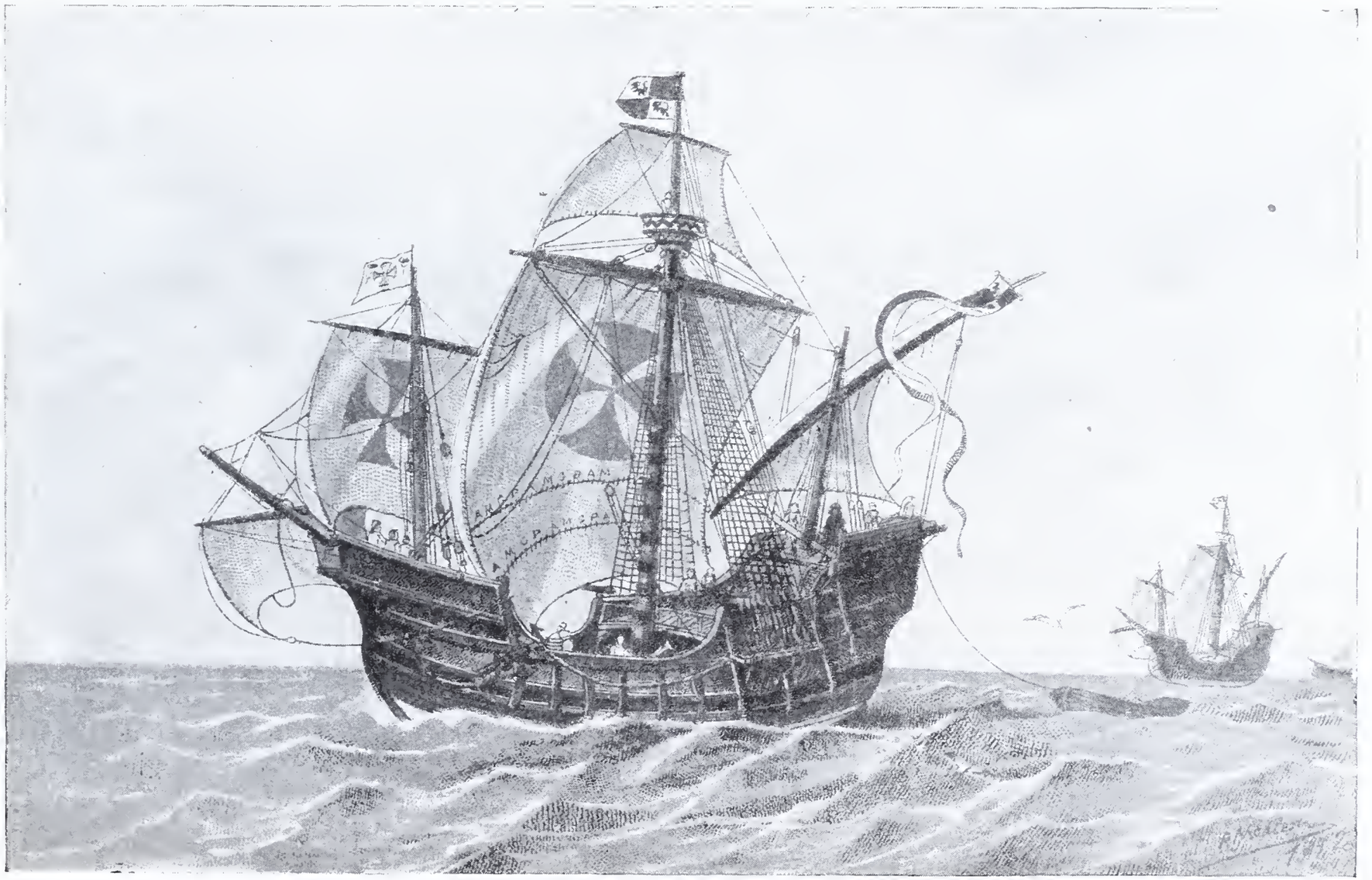
| | | |
|---|---|---|
| Area of main sail and bonnets, | 2,496 | square feet. |
| " foresail | 1,225 | " " |
| " mizzen sail | 945 | " " |
| " topsail, | 735 | " " |
| " spritsail, | 580 | " " |
| Total, | 5,981 | " " |

It was customary in the fifteenth and sixteenth centuries to decorate the sails with figures, giving preference to those representing the patron saints of Spain or of the navigators. Arms and blazons were also used, but the cross was by far the most common, as appears from engravings of the caravels of Columbus made in Rome in 1493.

All the sails were square or trapezoidal in shape, and the yard arms were generally made of two pieces, with long scarfs in the center. It seems that the flags and pennants were fixed on staves, which were raised to the topmasts.

The shape of the blocks was very different from that of those now used. They were almond-shaped, without loops, and with a strap passing through a hole drilled in the narrow end.

The vessel being successfully finished and rigged, various trials were made at the dock to test her stability, and gave splendid results, as will be seen from the following data.



THE NEW SANTA MARIA.

## FIRST TRIP OF THE SANTA MARIA.

The new Santa Maria was finished, rigged and ready to set sail on the 28th of July, 1892, ninety-five days after laying the keel. She was then delivered to the Minister of Marine, who placed her under the command of Captain Victor Concas, and designated Gutierrez Tobral as second in command.

On the 30th the signal having been given from the steamship Legazpi, the Minister gave orders for the "Nao" to be taken in tow, and she floated down the bay to Cadiz, saluted in passing by the Spanish and foreign men-of-war at anchor.

On the 31st she was taken to the Port of Huelva, towed by the trans-Atlantïc steamship Piélago in the wake of the Legazpi. The national and foreign cruisers of light draft followed her in two lines.

On 2d of August the 'Nao" set sail for the port of Palos with a very light wind and the main fore and topsails set. She answered the helm well, with a tendency to luff, and made four to five miles an hour.

On the anniversary of the quadricentennial of Columbus' great enterprise, the flags of all the American nations were raised on the Convent of La Rábida, and were saluted by the lombards on the Santa Maria and by a field battery on the heights. It was arranged that at this signal the facsimile of Columbus' flagship should weigh anchor and go to sea, following the same course taken by the Admiral of the Indies. But on this 3d day of August the light land breeze that blew on that memorable day in 1492 gave place to dense clouds that covered the sky and head winds that carried a cold fog towards the shore.

It was necessary to tow the symbolical vessel, although on crossing the bar her sails, on which was painted the sign of salvation, were set, and thus in tow she sailed along to the head of the line of battle ships, saluting them with her lombards and falconets. They in turn manned their yards and saluted the old standard of Castile with their artillery and music. The bay offered a glowing spectacle—the contrast of a model of the naval art of the fifteenth century side by side with the most magnificent models of nineteenth century. That small vessel compared with the colossal modern ships that move about at will, presented as if by magic all the progress that has been made between the two dates, influenced in no small degree by the discovery to which that vessel contributed.

She was honored thus for a little less than an hour by the ironclads and cruisers which served as an escort. The Minister then commenced the return movement amid the cheers, the music and the salvos of the guns.

The following ships took part in the pageant:

## List of the Vessels Which Took Part in the Naval Review at the Port of Palos, August 3, 1892.

ARGENTINE REPUBLIC: *Almirante Brown*—Admiral, Daniel Solier; Com., Domec Garcia. *Veinte y Cinco de Mayo.*

AUSTRIA: *Aurora*—Com., M. Thewalt.

GREAT BRITAIN: *Australia*—C., Swinton C. Holland. *Amphion*—C., John R. E. Pattison. *Scout*—C., Walter S. Goodridge. *Torpedo boat*—Lieut., Hugh le D. Stapleton. *Torpedo boat*—Lieut., Allan T. Everett.

FRANCE: *Duguesclin*—Com., Mr. Blanc. *Hirondelle*—Com., Mr. Bellue.

HOLLAND: *Bonaire*—Com., A. F. Krabbe.

ITALY: *Lepanto*—Admiral, C. A. de Liguri; C. N. S., Grenet Francesco; *Bausan*, Cavaliere de Libero; *Dogali*, Cavaliere Giorelo; *Duilio*, Conde Candiani de Olivala.

MEXICO: *General Zaragoza*—Com., Reginald Carey Breno.

PORTUGAL: *Vasco de Gama*—Com, N.

SPAIN—*Legazpi*—Minister of the Navy, J. M. de Beránger; Com., Lieut. Adriano Sanchez Lobatón. *Reina Regente*—Com., José Pilón. *Victoria*—Com., Manuel Dueñas. *Alfonso XII.*—Com., José de Guzman. *Isla de Cuba*—Com., Salvador Rapallo. *Isla de Luzon*—Com., Ramón Valenti. *Temerario*—Com., Rafael P. de Bonanza. *Cocodrilo*—Com., Adolfo España *Nautilus*—Com., Fernando Villamil. *Arlanza*—Com., Alberto Castaño. *Cuervo*—Com., Lieut. Manuel Pasquin. *Piélago*—Capt. Pla.

UNITED STATES: *Newark*—Admiral, A. E. K. Benham; Commodore, C. S. Carey.

AND

*Santa Maria*—Com., Victor Concas.

From the New York *Tribune* of November 27, 1892, I take the following interesting notes on the Pinta and the Niña :

"The Pinta and the Niña are much smaller than the Santa Maria, and while both of these smaller vessels are apparently from the same model and the same size, the Pinta is, if anything, a little larger—say about ten tons—her tonnage being about 130 tons. The two caravels are fac-similes of the two of the same name that sailed in the Columbus fleet, and were built at Barcelona by two shipbuilders named Parke & Cardona. Their construction was begun in July, and they were delivered to the representatives of the United States Government in September. * * * * In a letter written by one of the officers of the Bennington he says : 'The appearance of the Niña as seen from the shore is deceptive, but on going on board it is at once perceived that her apparently disproportionate height above the water line is due to her lofty bulwarks, particularly those running around the poop ; and as her great breadth, some twenty-three feet, is very great in proportion to her length, which is fifty-seven feet, she is really a very much more seaworthy craft than a cursory glance would lead one to expect. The space underneath the poop is divided by a partition into two cabins, one for the crew and the other for the officers. From here a hatchway leads down to the hold, which is open the whole length of the vessel, and which gives, therefore, a better idea of her size.'

"From the exhaustive description given by the officer writing the foregoing letter it is evident that the designers and the builders have done their best to reproduce everything exactly as it was when the original vessels sailed from the harbor of Palos. Even the pump furnished to the vessel, to be used in case she springs a leak, is made of wood, and after the old primitive form. * * * *

"These two vessels are lateen-rigged, and if necessary the sails may be used. On the bulwark of the poop are mounted four culverins (breach-loading long and slender guns ornamented with the figures of serpents), each carrying a six-ounce ball. These are mounted upon swivels, and by means of levers may be trained in any direction. There are also two small boats to each of the caravels, their model being peculiar in that it gives as broad a bow as is the stern. The principal dimensions of these three peculiar craft are " :

| | Santa Maria. | Pinta. | Niña. |
|---|---|---|---|
| | Feet. | Feet. | Feet. |
| Length of keel, | 62 | 52 | 46 |
| Length on main deck, | 75 | 65 | 56 |
| Breadth of beam, | 22 | 23 | 18 |

At the date of my writing these notes (April 4th) the *Santa Maria* has left Porto Rico, where she arrived under sail, and is coming to Hampton Roads, and the Pinta and Niña are at the Navy Yard at Havana, to which place they were taken in tow by the United States cruisers Newark and Bennington, and will, in a few days be at the rendezvous, previous to their coming to this city for the great Naval Review, which is to take place on the 27th of April. They are coming under the Spanish flag, as they have been transferred to the Spanish Government, and the three vessels after the Chicago Exhibition will be presented to the United States.

I will conclude with a quotation from Monleón: "The caravels of Columbus had nothing particular, nothing strange to distinguish them from the other vessels of the time, and this was necessarily the case as at that early epoch the great variety of naval types known to us did not exist, and many of them would not have served for the purpose for which they were destined; and it was not the result of the adversities experienced by the illustrious Genoese, but a well considered and carefully weighed design of the able navigator, which enabled him to avail himself not only of the resources at his disposal, but of what he thought to be most convenient and useful in ensuring the success of his enterprise."

## THE CREWS OF THE SANTA MARIA, PINTA AND NIÑA.

Jeronimo Cardano, a mathematician of the sixteenth century, the improver of the compass, used to say that: to praise Columbus was not to praise a man, nor elevate a lineage, nor to praise a city or kingdom, but that it was to proclaim a glory of humanity benefited by his discovery.

When the navigator in whom this glory is symbolized discovered the West Indies he commanded a fleet of three vessels manned by sailors who, in the endeavor to lift the veil from the ocean, accompanied him in his risks, his works and his privations, all of whom should have a part in that glory which now surrounds only the name of the chief of that heroic enterprise. For this reason attempts have been made to collect the names of those who embarked with him from the Port of Palos on the three ships. But few, however, have been found, as with the loss of papers they have been forgotten.

Navarrete published in his "Colección de Viajes," etc., a list of forty persons which was sent to him from the archives of the Indies, having understood by the heading that they died on the Island of Hispaniola; they were the men whom Columbus left in Fort Navidad after the wreck of the flagship, and, therefore, those who sailed in the Santa Maria—the first Europeans whose blood stained the newly discovered lands. The exact number of them will never be known. Some of the official documents state that they numbered thirty-seven, others place the number at thirty-eight, and still another says thirty-three men were left at Fort Navidad by Columbus, who were found dead when he returned on his second voyage. We are unable to state the exact number of men composing the expedition. Ferdinand and Las Casas put it at 90. Oviedo raised that number to 120. Peter Martyr says there were over 200, and Aspa believes there were more ships and men than we suppose. But upon examining the few data we possess and taking into account the size of the vessels and the amount of provisions and water necessary for a long voyage, we reach the conclusion that the mariners numbered ninety. If to these be added the officers of the Kings, their squires and servants, the total number would be 120; this will reconcile the various opinions of the early chroniclers of the Indies. The names of the captains, first officers and a few prominent members of the expedition are remembered by all, and agree with Columbus's log; but no one mentions the names of those who made up the bulk of the expedition, and they would to-day be forgotten were it not that Diego Colon needed their evidence in the suit that he instituted against the Crown, and for this reason he searched them out. As the counsel for

the Crown also needed this testimony, they succeeded in finding about sixty of them, which was a considerable number, everything being taken into consideration.

## CREW OF THE SANTA MARIA.

Christopher Columbus, Captain for their Majesties; Juan de la Cosa, Master from Santoña; Sancho Ruiz, Pilot; Alonzo Perez Roldan, Pilot; Master Alonzo, Surgeon; Master Diego, Quartermaster; Rodrigo Sanchez de Segovia; Pedro Gutierrez; Rodrigo de Escobedo, Clerk of the Fleet; Diego de Arana, Alguacil Mayor; Diego Lorenzo, Alguacil; Luis de Torres, Reformed Jew Interpreter; Domingo Lequeito; Lope, Caulker; Jacome, the rich Genoese; Pedro Terreros Rodrigo de Jerez, Ruiz Garcia, Rodrigo de Escobar, Francisco de Huelva, Rui Fernandez de Huelva, Pedro de Soria, Pedro de Bilbao, Pedro de Villa, Diego de Salcedo, servant to Columbus; Pedro de Acevedo, Page.

## CREW OF THE PINTA.

Martin Alonzo Pinzon, Captain; Francisco Martin Pinzon, Master; Cristobal Garcia Xalmiento, Pilot; Juan de Umbria, Pilot; Juan de Jerez, Seaman, Palos; Bartolome Garcia, Quartermaster, Palos; Juan Perez Vizcaino, Caulker, Palos; Garcia Hernandez, Rodrigo de Triana, de Lepe (who first saw land), Juan Rodriguez de Molinos, Juan de Sevilla, Garcia Alonzo, Gomez Rascon, Cristobal Quintero, Juan Quintero, Diego Bermudez, Juan Bermudez (discoverer of the Bermuda Islands), Francisco Garcia Vallejo, Francisco Garcia Gallego, Pedro de Arcos.

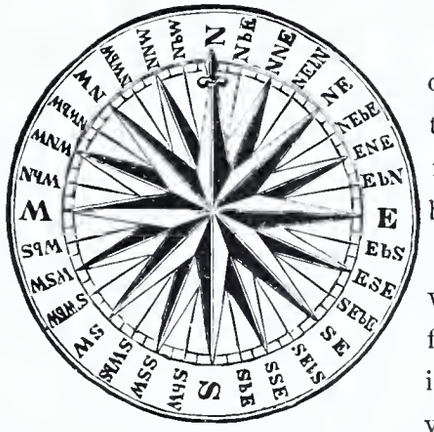
## CREW OF THE NIÑA.

Vicente Yañez Pinzon, Captain, Palos; Juan Niño, Master; Pedro Alonzo Niño, Pilot; Bartolome Roldan, First Pilot; Diego Martin Pinzon the elder, Palos; Francisco Pinzon, Palos; Francisco Niño Moguer, Bartolome Perez, Gutierre, Palos; Juan Ortiz, Palos; Alonzo Gutierrez Querido, Pedro de Lepe, Alonzo Morales, Andres de Huelva.

The official positions and classes of employment as shown by the log book is as follows: Captain, Master, Pilot Veedor (Inspector), Notary, Physician, Alguacil Mayor (Sheriff), Quartermaster, Seamen, Esquire, Apprentices, Page, and as ship officers, Carpenter, Caulker, Cooper, Steward, Gunner and Bugler.

Those who were left at Española and died there: Diego de Arana, Governor; Pedro Gutierrez, Lieut.; Rodrigo de Escobedo, Lieut.; Master Alonzo, Surgeon; Diego Lorenzo, Alguacil; Luis de Torres, Interpreter; Lope, Caulker; Domingo de Lequeito, Jacome, the rich Genoese; Pedro de Lepe, Alonzo Morales, Andres de Huelva, Francisco de Huelva. Their names must never be forgotten.

## INSTRUMENTS.

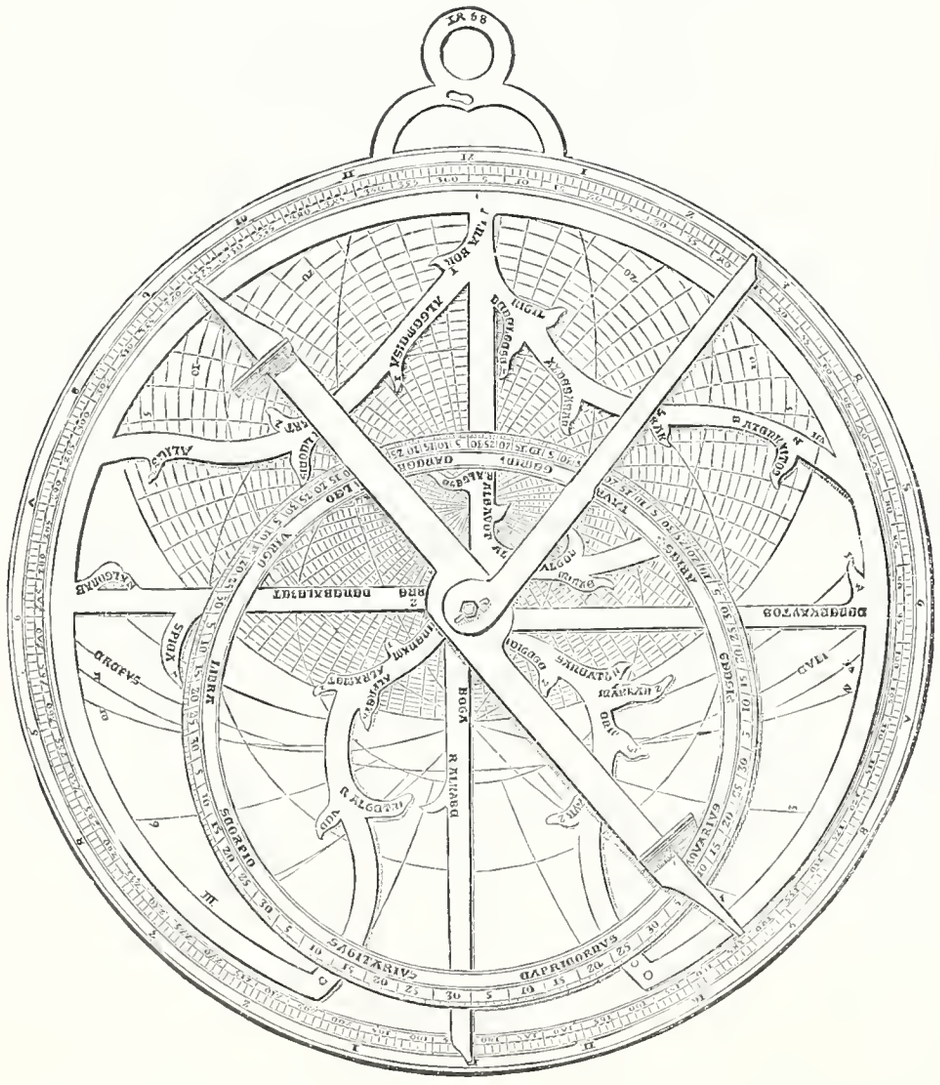



Columbus depended, in judging of his speed, on the eye alone, basing his calculation on objects or bubbles floating past the ship, while the running out of his hour glass afforded the multiple for long distances. Yet Columbus's reckoning was so well calculated that the real distance from the Canary Islands to Guanahani is almost exactly the same as given by him.

If it be an error to suppose that Columbus embarked in small, undecked vessels on his voyage of discovery, it is none the less an error to suppose that he employed the primitive floating needle. The Mariner's Compass underwent during the fourteenth century two important modifications which made it essentially what it is to-day. It was hung on the vertical style on which it can freely turn in its case, and it was placed within two concentric circles, simple but admirable inventions which bear the seal of true genius. It was thus made in Mallorca by Jaime Ribas, and this was the style used on board the Portuguese and Castilian vessels in their trips to the African coasts and the Low Countries. Its use was one cause of their progress. Columbus gives testimony in his own handwriting of the use of the improved needle in the Mediterranean in a letter written from Hispaniola in 1495, addressed to the Catholic kings.

### THE CROSS STAFF.

The "cross staff" appears to have been used by astronomers at a very early period for measuring heights and distances, and more recently by seamen for measuring altitudes. This was one of the few instruments possessed by Columbus and Vasco da Gama. The old cross staff, called by the Spaniards "ballestilla," consisted of two light battens. The part we may call the staff was about an inch and one-half square, and thirty-six inches long. The cross was made to fit closely and to slide upon the staff at right angles. Its length was a little over twenty-six inches, in order to allow its sights to be placed exactly twenty-six inches apart. A sight was also fixed on the end of the staff for the eye to peep through at the other two sights or objects to be measured. It was made by describing the angles on a table and laying the staff upon it. The scale of degrees was marked on the upper face. Afterwards shorter crosses were introduced so that smaller angles could be taken with the same instruments. These angles were marked on the side of the staff.



## ASTROLABE.

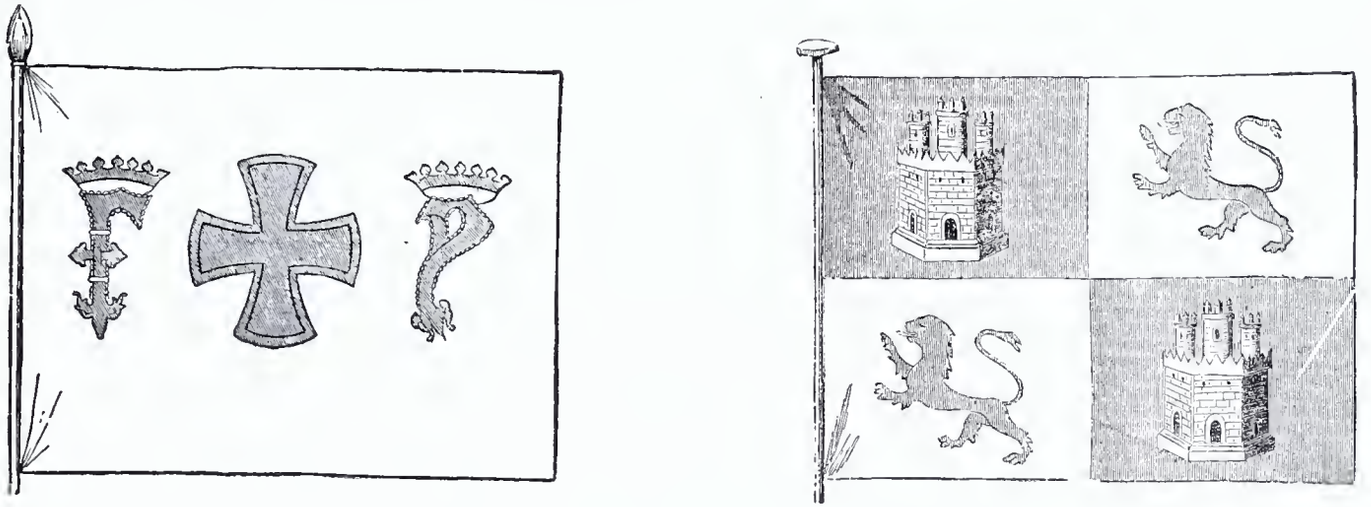
It was made of tin or copper, about one-fourth of an inch thick and six to seven inches in diameter, and was perfectly circular except at one place, where a projection was provided for a hole by which it was suspended. Weight was considered desirable in order to keep it steady when in use. The face of the metal having been well polished, a plumb line from the point of suspension marked the vertical line which, when carefully subdivided, gave the horizontal line and center. The upper left quadrant was divided into degrees. The second part was a pointer of the same metal and same thickness as the circular plate, about one and one-half inches wide and in length equal to the diameter of the circle. The center was bored and a line was drawn across it the full length which was called the line of confidence. On the end of that line were fixed plates having each a larger and smaller hole, both exactly over the line of confidence as signs for the sun and stars. The pointer moved upon a center the size of a goose quill. When the instrument was suspended, the pointer was directed by hand to the object, and the angle read on the one quadrant only.

The Log of Columbus is the document upon which we base our conclusions regarding the compass he employed, and we are further fortified in our opinion by the clear and elegant painting of the compass.

## DETAILS AND LIFE ON BOARD THE CARAVELS.

### Flags.

The chart of Juan de la Cosa—an authentic document, in view of the fact that he was the master and owner of the flag-ship of Columbus—shows the caravels on the coast of the new world, with the Royal Standard of Castile floating from the main top-mast. This was rectangular in shape with rounded corners, quartered in red and white, bearing castles in gold and lions gules. He puts the same standard on every part of the coast that was visited and of which they took possession. This was the same standard employed in Castile for about two centuries.



THE FLAGS OF COLUMBUS.

In the ceremonies observed on landing on the 12th of October, 1492, Columbus bore the Royal Standard and the flags of the Green Cross, which were carried on all vessels, and were ornamented with an F. and a Y. on opposite sides of the cross with a crown above each initial.

In the log there is an entry that on the 18th of December the Admiral showed the Cacique Guacanagari, the Royal Standards and those of the Green Cross. Among the former was doubtless included the pennant, the insignia of the Captain

General on land and sea. It consisted of a square piece of crimson damask fixed to a lance and bearing a painting of the Savior on the Cross. De Bry, who, as is well known, was the first to spread the knowledge of the discovery, published in his illustrated accounts, a picture of Columbus in complete armor, holding in his right hand a Captain General's baton, and in his left the pennant.

The Log of the Admiral frequently repeats that he had dressed the ship on festivals of the Virgin, on making land, and on various occasions. As streamers were in use until the fourteenth century with castles and lions painted on them, it is presumed that the caravels bore them as well as others required by the regulations.

### Cabins and Quarters.

During the fifteenth century the vessels carried only one high cabin on the poop which was occupied by the commander. Some idea of the dimensions of the cabin of the Santa Maria may be formed from the entry in the Log of December 18th, 1892, at the time of the visit of Cacique of Santo Domingo. It is stated that he and the Admiral alone sat at the table, two other Indians sitting on the cabin floor, while the others were obliged to remain outside. It was at this visit that Columbus made the Cacique a present of the bed-hangings.

### Beds.

On military expeditions, when the ordinary crews were increased by land forces, the captains only were allowed to quarter in the cabin, in which case they built canvas screens. The officers and passengers, of whatever rank, were content with a mattress spread out in an out of the way place during the night, it being tied up during the day. The soldiers and sailors were denied even these comforts, as they were forbidden to sleep under deck, even when not on watch. From the Indians, Columbus and his companions learned to sleep in hammocks, since which time they have been universally adopted by seamen.

### Food.

Says Fernando Colon in his history: "The Lord help me! I have seen men waiting for the darkness of night to eat their food, so as not to see the worms in it; while others, having become accustomed to this, did not stop to take them out,

fearing they would lose their supper if they did. The water, carried in wooden casks and hooped with the same material, would become unfit for use; moreover much was spilled, thus making the quantity scarce.

Bacon, salt fish, beans, cheese and bread comprised the articles of provision, the latter being the principal food on board, which, although the combined effect of the heat and dampness of the hold caused it to ferment, held out better than the bacon and salt fish. But even these unpalatable meals were devoured with relish.

### Galleys.

The galleys were box-shaped and made of brick with iron cross pieces, the fire-place and hearth being at the bottom, similar to those used at present in Andalucia. These were placed on deck, a covering being made for them in the shape of a tent.

### Lights.

The insignia of command was the poop lantern, which could only be used by the Chief of the Squadron. In order to distinguish it, it was customary to ornament its exterior artistically according to the taste of the time. At first sheets of mica were employed to protect the light, but afterwards glass was used. This light and that of the helmsman's were the only ones used on board. No one was permitted to use a light below except inside of a lantern.

### Pumps.

Pumps were generally of wood, the Spanish being preferred to the Flemish or Italian. It was usual to carry a full assortment of extra pieces.

### Religious Observances.

Although the trip to the Indies had become an every-day occurrence, no one thought of embarking without first making his will and going to confession and communion. The Captain-General's orders to this effect were stringent, and were that every one should go on board in a state of grace. During the voyage public sins were prohibited, as were blasphemies, gambling to excess, and doing or saying anything against the honor of God or the King. The story of the

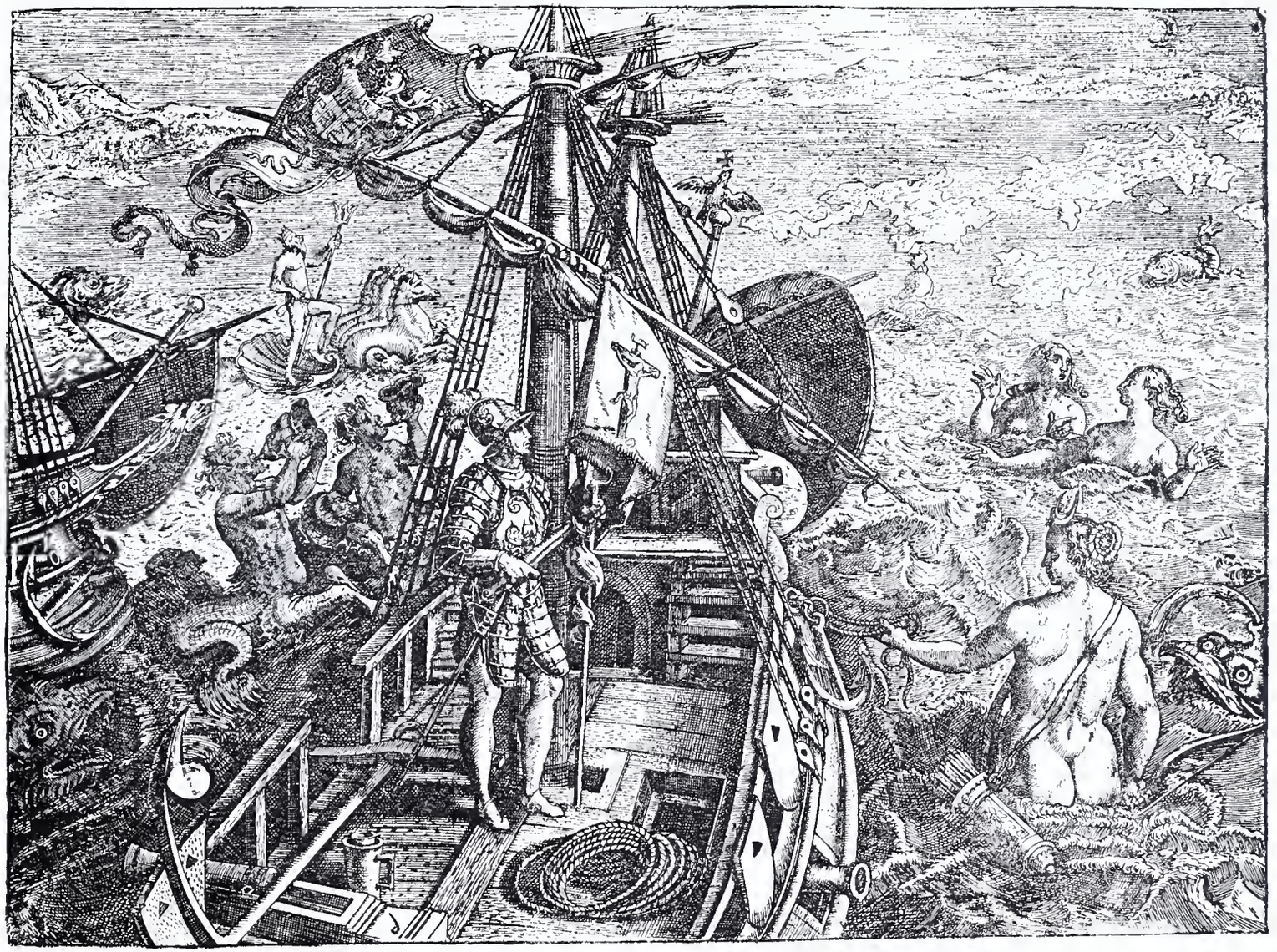
pilgrimage of Columbus and a part of his crew to the church at Palos before going on board his vessel, in order to be prepared for death, is well known. The pious Admiral makes this entry in his Log: that on the 11th of October—the eve of the discovery—the crews had sung the customary *salve*, and afterwards at the supreme moment when he fell on his knees, cap in hand, to give thanks to the Almighty, he was followed by the whole crew, who began singing the "Gloria" and the "Te Deum."

## Costumes.

At that time there was no difference in the dress of the landsman and the sailor, as no uniform was exacted. However the red cap began to be considered the distinctive sign of the sailor, and the tan-colored cap that of the landsman. In the paintings of that period the sailor is represented by the red cap. They were afterwards mentioned by the Admiral in the Log. They were usually made in the looms of Toledo.

Sailors also used a characteristic tabard, consisting of a kind of short cloak with hood which covered head, neck and shoulders, and formed an excellent protection against the weather. The trumpeters, who sometimes acted as heralds, were dressed in better style, having trunk hose, doubled with loose sleeves and the Royal Coat-of-arms embroidered on the breast and cloth cap.

Columbus was a brother of the Third Order of the Franciscans, and as their frocks were of a brown color, it is thought by many that this was the garb that he wore; while he really wore the tabard used by all sailors, which also happened to be of the same color. And even to-day the same style of cloak is worn by the peasant of Sagayo and other places of old Castile, and is called "anguarina."



DE BRY'S COLUMBUS.

## ARMAMENT OF THE CARAVELS.

Not even an approximate estimate of the number, quality, form and place of the pieces of artillery mounted on the caravels can be formed from the Log of the Admiral; at the same time the kind of artillery they carried cannot be doubted. This entry appears on the Log of Columbus under date of October, 1892: "The Caravel Pinta discharged a lombard as a sign of land and raised a flag to the top of the mast." Again, on the 18th of December he writes that in celebrating the nativity of the Holy Virgin he discharged lombards, raised flags and dressed ships. The cacique of Santo Domingo came on board, and on leaving the ship was saluted by many discharges from the lombards. On the 2d of January, 1493, after the wreck of the flagship, Columbus, desiring to intimidate the Indians with the force of the Spanish arms, had a lombard mounted on land and fired a shot at the hull of this vessel, the stone passing through her sides and going far out to sea. Some time afterwards, having finished the fort which he called Navidad, he states that he left considerable artillery, powder and ammunition there and also a gunner.

This is all that is found in the extract from the Log preserved by Las Casas and published by Martin Fernandez de Navarrete.

The phrase "mucha Artilleria," used by Columbus in writing about the stores left at Fort "Navidad" as well as when he speaks of the salvos, was a relative one.

It is understood that he left all the artillery from the wrecked Santa Maria at the fort, as it would only have been in the way on board the other ships. The number of guns on the Santa Maria was probably two lombards and six falconets. Some of these pieces had changeable breeches and some were muzzle loaders, these latter being closed and forged at the breech. The pieces with changeable breeches were used on deck, for with two or three breeches that could be loaded separately, the firing was more rapid. The muzzle loaders were used between decks. Diego Garcia del Palacio in his "Instrucción Nautica" gives the reason for this as follows: "All the open pieces with changeable breeches should be above deck, as if they are between decks, the smoke that remains inside interferes with the gunner's sight."

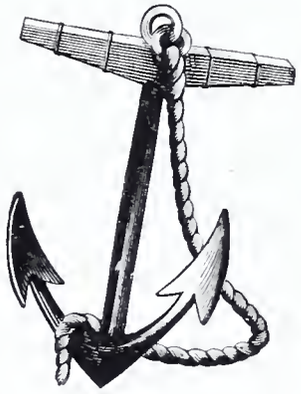
The caravels usually carried those pieces firing two or three pound stone shot, and this was probably the calibre of those carried on the vessels of Columbus. In the Museum of Artillery at Madrid there is a specimen of a small lombard—

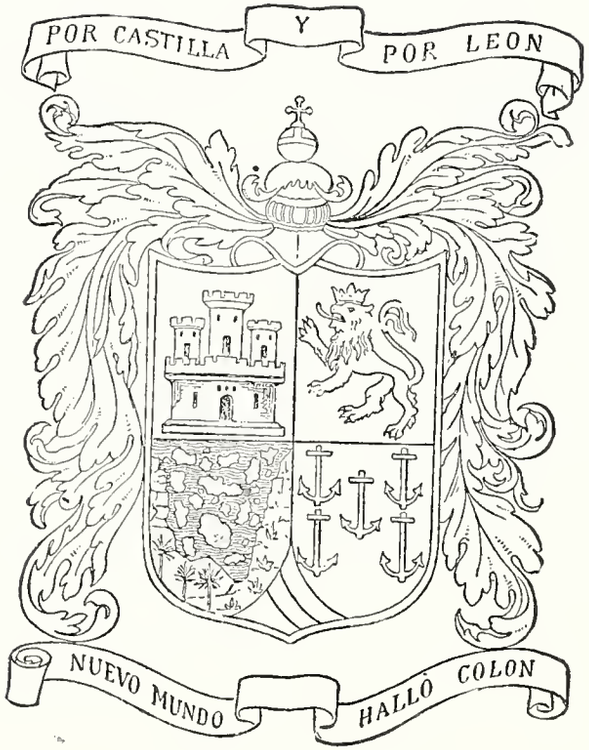
a two pounder—whose dimensions correspond exactly with the description of Ruiz de Ibarra and Perez de Tolosa, and also with the catalogue of the year 1500.

From a careful examination their method of construction is supposed to have been as follows: First, the inner cylinder was made of wrought iron bars or staves 2½ inches thick, held together by rings 5 inches in thickness and from 22 to 24 inches in length, the joints of both being covered by rings 2 inches thick by 8 inches wide. The re-enforcement at the muzzle was prolonged at its upper part and formed a ridge parallel to the axis and to another ridge formed by two supplementary hoops. As stated above there were two kinds of guns used—one with changeable breech and the other muzzle loaders.

It is very difficult to determine the shape and construction of the carriages, which, in 1505, appear to have been called "coruefias." This is one of the most obscure points in regard to ancient artillery. The drawings give no idea of the manner in which these lombards were mounted on board the caravels. It has been necessary in making these reports to be guided by the analogy existing between the carriages and the mountings of field-pieces, and by such slight indications as are furnished by the Carrac La Charente, in which there were some pieces mounted on wheels.

It is natural to suppose that these lombards were mounted on solid pieces of wood in which a channel must have been hollowed out for setting the piece. They must have rested on two planks, front and rear, of sufficient length to give the whole greater stability in such a way that the mounting, not coming in direct contact with the deck, should leave sufficient space for the strong fastenings of ropes which held together the lombard and its carriage.

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(ILLUSTRATED.)

N. PONCE DE LEON, PUBLISHER,
40 Broadway, New York.
1893

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A Monthly Magazine in the Spanish Language published at 197 Pearl Street. Agent,

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